

CLAIMS

What is claimed is:

1. A DNA construct comprising an encoding sequence for a  
5 KAS protein demonstrating activity preferential for medium  
chain fatty acid substrates of C6:0-ACP, C8:0-ACP and C10:0-  
ACP.
2. A DNA construct according to Claim 1 wherein said KAS  
protein is from a *Cuphea* species.
- 10 3. The construct of Claim 1 wherein said KAS protein is  
a KAS factor A protein.
4. The construct of Claim 1 wherein said KAS protein is  
a KAS factor B protein.
5. The construct of Claim 2 wherein said species is *C.*  
15 *hookeriana* or *C. pullcherrima*.
6. The construct of Claim 5 wherein said encoding  
sequence is chKAS B-2.
7. The construct of Claim 5 wherein said encoding  
sequence is chKAS B-31-7.
- 20 8. The construct of Claim 5 wherein said encoding  
sequence is chKAS A-2-7.
9. The construct of Claim 5 wherein said encoding sequence  
is chKAS A-1-6.
10. The construct of Claim 5 wherein said encoding sequence  
25 is cpuKAS B/7-8.
11. The construct of Claim 5 wherein said encoding sequence  
is cpuKAS B/8-7A.

12. The construct of Claim 5 wherein said encoding sequence is cpuKAS Ap7-6A.

13. The construct of Claim 5 wherein said encoding sequence is cpuKAS A/p8-9A.

5 14. The construct of Claim 5 wherein said encoding sequence is chKASIII-27.

15. An improved method for producing medium-chain fatty acids in transgenic plant seeds by expression of a plant medium-chain thioesterase protein heterologous to said transgenic plant,  
10 the improvement comprising expression of a plant synthase factor protein heterologous to said transgenic plant in conjunction with expression of said plant medium-chain thioesterase, whereby the percentage of medium-chain fatty acids produced in seeds expressing both a plant synthase factor protein  
15 and a plant medium-chain thioesterase protein is increased as compared to the percentage of medium-chain fatty acids produced in seeds expressing only said plant medium-chain thioesterase protein.

16. The method of Claim 15 wherein said medium-chain  
20 thioesterase protein is a ChFatB2 protein.

17. The method of Claim 15 wherein said medium-chain thioesterase protein is a CpFatB1 protein.

18. The method of Claim 15 wherein said medium-chain thioesterase protein is a C12 preferring thioesterase from  
25 California bay.

19. The method of Claim 15 wherein said plant synthase factor protein is expressed from a construct according to Claim 1.

20. The method of Claim 19 wherein said synthase factor A protein is from a *Cuphea* species.

21. The method of Claim 20 wherein said *Cuphea* species is *C. hookeriana* or *C. pullcherrima*.

22. A method of altering the medium-chain fatty acid composition in plant seeds expressing a heterologous plant medium-chain preferring thioesterase, wherein said method comprises

providing for expression of a plant synthase factor protein heterologous to said transgenic plant in conjunction with expression of a plant medium-chain thioesterase protein heterologous to said transgenic plant, whereby the composition of medium-chain fatty acids produced in said seeds is modified as compared to the composition of medium-chain fatty acids produced in seeds expressing said plant medium-chain thioesterase protein in the absence of expression of said plant synthase factor protein.

23. The method of Claim 22 wherein said medium-chain thioesterase protein is a ChFatB2 protein.

24. The method of Claim 22 wherein said medium-chain thioesterase protein is a CpFatB1 protein.

25. The method of Claim 22 wherein said medium-chain thioesterase protein is a C12 preferring thioesterase from California bay.

26. The method of Claim 22 wherein said plant synthase factor protein is expressed from a construct according to Claim 1.

27. The method of Claim 26 wherein said synthase factor A protein is from a *Cuphea* species.

28. The method of Claim 27 wherein said *Cuphea* species is *C. hookeriana* or *C. pullcherrima*.

29. The method of Claim 22 wherein said fatty acid composition is enriched for C10 fatty acids.

30. The method of Claim 22 wherein said fatty acid composition is enriched for C12 fatty acids.

31. The method of Claim 22 wherein said fatty acid composition is enriched for at least one medium chain fatty acid and at least one other medium chain fatty acid is decreased.

32. The method of Claim 31 wherein said enriched fatty acid is C12 and said decreased fatty acid is C14.